

# How to Graph in Polar Coordinates

## Step 1: Construct a table of values

-Unit Circle may help

-The easiest values for  $\theta$  to start with are  $0, \pi/6, \pi/4, \pi/3$ , and  $\pi/2$

**\*Keep in mind:** Polar coordinates are expressed in terms of a distance,  $r$ , and an angle,  $\theta$ .

**Example:**  $r(\theta) = 4 \cdot \cos(\theta)$

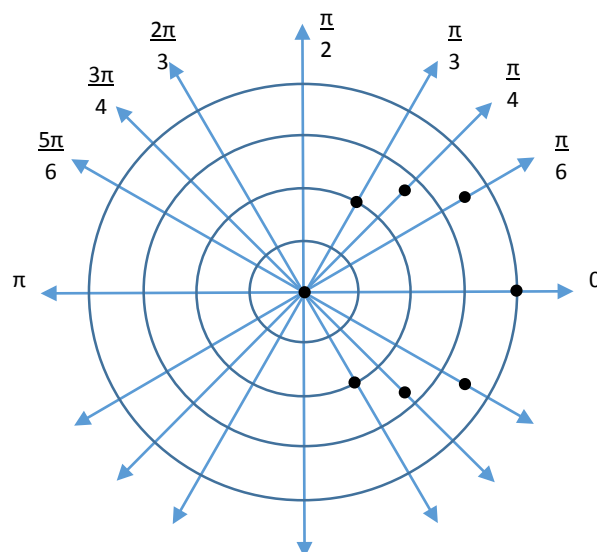
$\theta$	$r = 4 \cdot \cos(\theta)$
0	4
$\pi/6$	3.5
$\pi/4$	2.8
$\pi/3$	2
$\pi/2$	0
$2\pi/3$	-2
$3\pi/4$	-2.8
$5\pi/6$	-3.5
$\pi$	-4

## Step 2: Plot the points

**\*This is most easily done on polar graph paper**

-Pick an angle,  $\theta$ , and move the corresponding distance,  $r$ , away from the origin

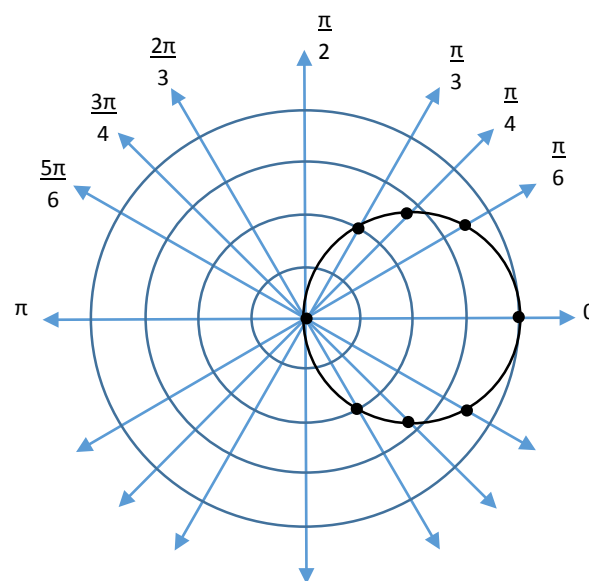
-If  $r$  is negative, move in the direction opposite to the angle



## Step 3: Connect the points with a smooth curve

-Start with  $\theta = 0$  and then carefully connect them in order

**\*Remember:** Each of these points corresponds to an angle so be sure to connect them accordingly!





# Polar Coordinates

Polar coordinates are an alternative way of representing the location of a point on a standard Cartesian plane that use the distance of the point from the origin ( $r$ ) and the angle of inclination measured counter-clockwise from the x-axis ( $\theta$ ).

## Converting between Polar and Rectangular coordinates:

Rectangular to Polar:

$$r^2 = x^2 + y^2$$

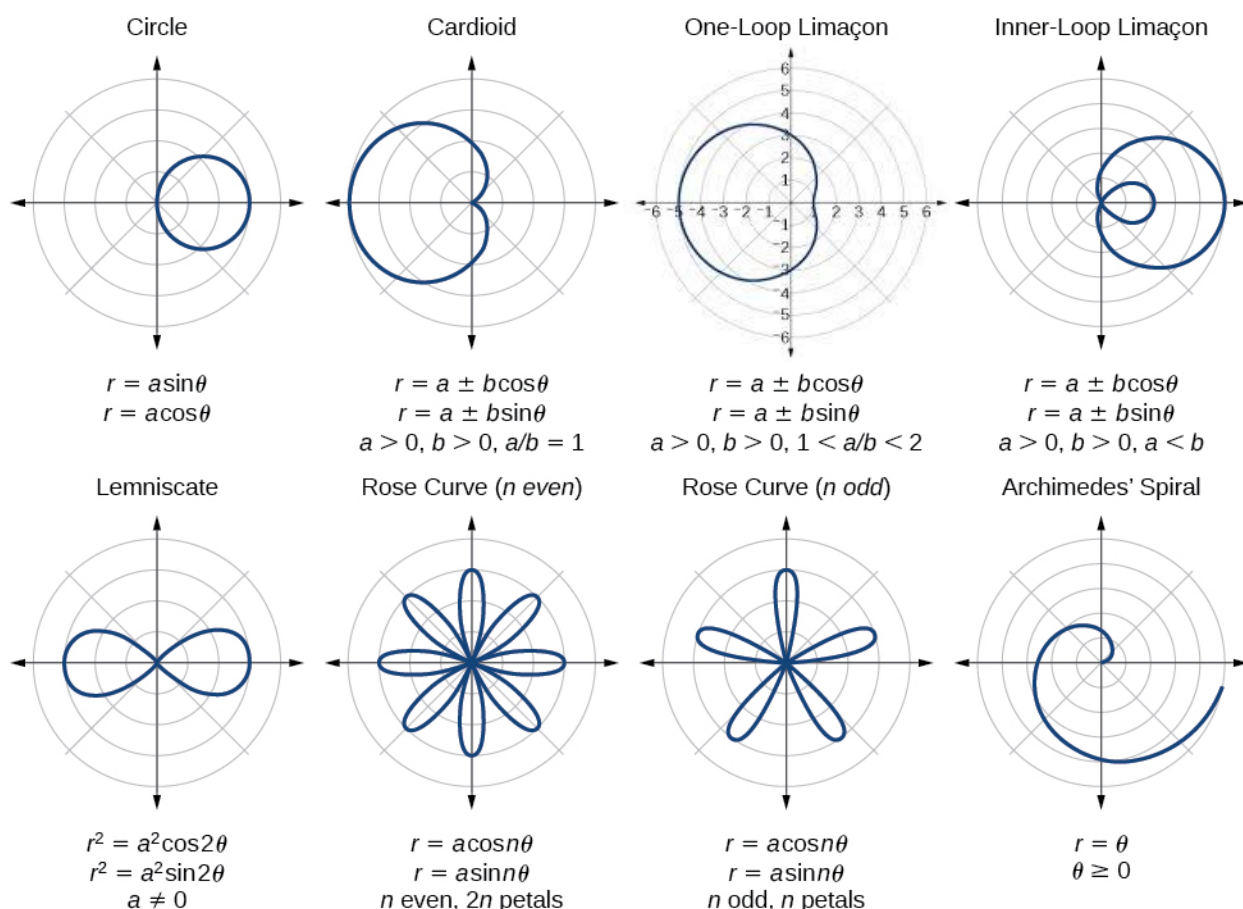
$$\theta = \tan^{-1}(y/x)$$

Polar to Rectangular:

$$x = r \cdot \cos(\theta)$$

$$y = r \cdot \sin(\theta)$$

## Families of Polar Curves:



## To check your graph on a calculator (TI-83/84):

- Press 'MODE' and highlight 'Pol' then press 'ENTER'
- Press 'Y=' and enter your function
  - Use the 'X,T,θ,n' key to enter your θ's.
- Press 'GRAPH' to view your function
  - adjust the viewing window with 'WINDOW' as needed